

Notes on Indian Caecilians

BY

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(With two text-figures)

Peninsular India has one of the richest caecilian faunas in the world, with no less than five recognized genera occurring there. Some of these are known in northern and north-eastern India, but they are presumably absent from the drier areas of north-western India and Pakistan.

In August 1959, I visited the Bombay Natural History Society and the Honorary Secretary, Mr. Humayun Abdulali, permitted me to examine the specimens in their collection (including one live specimen). All the forms had been referred to their proper genera. As in most museums all striped forms of *Ichthyophis* were regarded as *I. glutinosus* (Linnaeus), and the uni-coloured forms as *I. monochrous*.

At the time of my visit, I had in press 2 papers dealing with the caecilians of south-eastern Asia and the Indo-Australian Archipelago, describing certain Asiatic species, including a new genus from India.

The collection was handed over to me for study. Among other forms, it contained representatives of two species I had recently described in the two papers which were at that time in press in America. It was too late to add data from these specimens to my papers. However, since they have now been published¹ Mr. Abdulali has suggested that I publish a short article in the Journal of the Society and, to the data taken from the Bombay collection, add pertinent information and keys for other recently described Indian forms, so as to make the article more useful to students in India. This I have done.

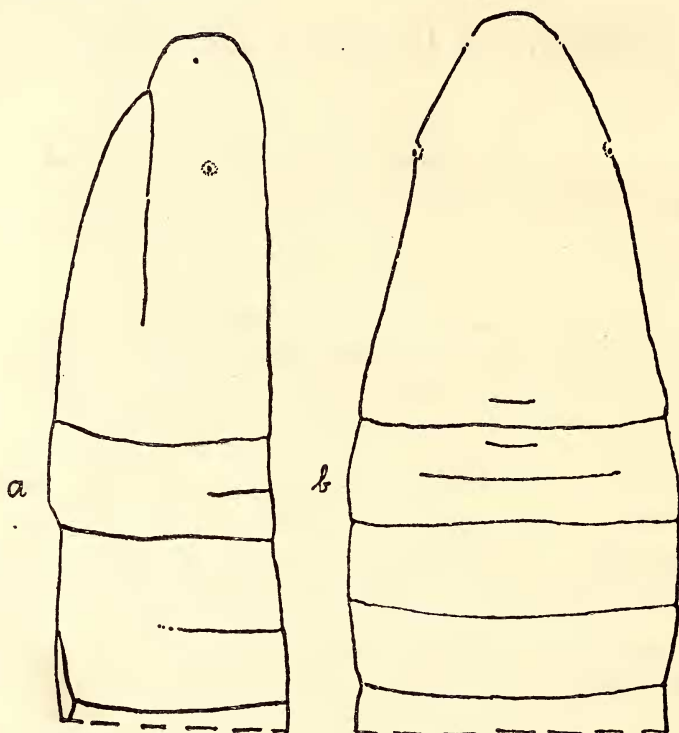
***Indotyphlus battersbyi* Taylor 1960**

Indotyphlus battersbyi Taylor, *Univ. Kansas Sci. Bull.* 40 : 31-36, figs. 1-4, 1960 [type locality, Khandala, Poona District, c. 1800 ft. (550 m.), India. Type, No. 49974, American Museum of Natural History, New York].

Three preserved specimens are in the Bombay collection : No. 1121 from Lonavla (about three miles from Khandala), Poona District, and two, Nos. 1178 and 1179, from the type locality, Poona District. I have

¹ On the caecilian species *Ichthyophis monochrous* and *Ichthyophis glutinosus* and related species. Taylor (1960) : *Univ. Kansas Sci. Bull.* 40 : 37-120, figs. 1-38 ; A new caecilian genus in India, *Univ. Kansas Sci. Bull.* 40 : 31-36, figs. 1-4.

examined also a living specimen obtained by Mr. Humayun Abdulali, from under a stone near the type locality. These specimens are



Text-fig. 1. *Indotyphlus battersbyi*

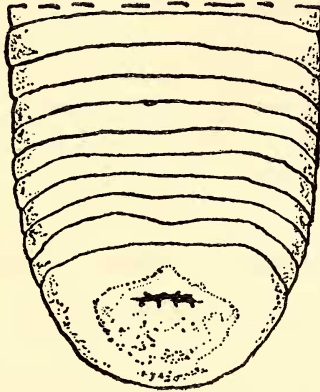
Head and anterior part of body, showing relative positions of nostril and tentacle (the eyes are not visible). *a.* side view, *b.* dorsal view. (From type, $\times 12$)

presumably the only ones known, other than the type. Their variable characters are given below :

Specimen	AMNH	BNHS	BNHS	BNHS
	type 49974	1121	1178	1179
Total length (in mm.) ..	170	200	205	220
Head length (1st groove) (in mm.) ..	4.2	5.4	5.5	5.5
Head width (1st groove) (in mm.) ..	3	3.7	3.8	3.8
Body width (in mm.) ..	3.7	3.95	3.8	4.1
Width in length (times) ..	46	50	49	53
Primary folds ..	139	138	133	141
Secondary folds ..	29	17	22	21
Total folds ..	168	155	155	162
*Maxillary-premaxillary teeth ..	9-9	12-12	11-11	14-14
*Vomeropalatine teeth ..	12-12	13-14	13-14	17-17
*Mandibular teeth ..	9-9	11-11	9-10	11-11
Splenic teeth ..	2-2	2-2	2-2	2-2

*Number of teeth increases somewhat with age.

On each side of the tongue, near its anterior end, there is a somewhat elevated rounded area almost surrounded by a deep groove. These areas are blackish, and in strong contrast to the light colour of the rest of the tongue. Superficially *Indotyphlus battersbyi* resembles *Gegeneophis carnosus*, a form also occurring in southern India ; however,



Text-fig. 2. *Indotyphlus battersbyi*

End of body, showing the transverse vent and the absence of a tail. (From type, $\times 12$)

the two species may be readily separated by examining the point of emergence of the tentacle. The position of the tentacular opening in *Indotyphlus* is directly anterior to the hidden eye, in line between the eye and nostril but much closer to the eye, whereas in *Gegeneophis* the opening is close behind the nostril and somewhat below it. The eye of *Gegeneophis* is hidden below the bones of the skull.

In my paper on caecilians (1960) in the key to the Indian genera I repeated Boulenger's error of stating that *Gegeneophis* lacks scales. I have since examined the type of the genus and scales are *certainly* present in the posterior part of the body where the secondary folds appear. The type of *Gegeneophis* has 114 primary folds and only six secondary, totalling 120.

In *Indotyphlus* the number of vertebrae in the type is 144, a number exceeding that of other known Asiatic caecilians. The number of vertebrae in *Gegeneophis carnosus* is not known.

The type of *Indotyphlus*, which does not bear the collector's name, may be one of the specimens collected by Charles McCann (1927) at Khandala, Poona District, and reported by him as *Ichthyophis monochrous* Boulenger, in the *J. Bombay nat. Hist. Soc.* 31(4): 1039. McCann states: 'When at Khandala during the month of September, 1919, I secured several specimens of this batrachian. It lives under stones, during the rains, in burrows much after the fashion of the earthworm

which it also resembles in its movements. At first sight it might well be mistaken for one of these creatures as its body is also coated with slime. On the removal of the stone under which it lives the animal soon begins its descent into its burrow away from the light.'

In the *Journal* 42 (1) : 64, Mr. McCann (1940) writes : ' On the 6th September 1931 while collecting frogs I discovered another specimen [of *Ichthyophis monochrous*] living under a stone on the banks of the lake behind a range of hills locally called the "Sausages". I have repeatedly hunted for this animal since its first discovery at Khandala, but without much success. The 1931 specimen measured 232 mm.'

The species is named in honour of Mr. J.C. Battersby of the British Museum of Natural History.

***Uraeotyphlus malabaricus* (Beddome)**

Caecilia malabarica Beddome, *Madras Month. Journ. Med. Soc.* 2 : 176, 1870, (type locality, Malabar).

Uraeotyphlus malabaricus Peters, *Monatsb. Akad. Wiss. Berlin*, 1879, p. 933 ; Boulenger, Catalogue of the Batrachia Gradientia s. Caudata and Batrachia Apoda in the collection of the British Museum, Ed. 2, 1882, p. 92, pl. V., fig. 3.

A single specimen in the Bombay collection, No. 222, from Ootacamund, Nilgiris, south India, is referable to this species. The secondary folds cannot be distinguished from the primaries by their appearance. The secondaries begin suddenly and at once have almost the same dimensions as the primaries : that is, they do not alternate longer and shorter as is typical of certain species of the genus. The total number of folds is approximately 242 (difficult to count because of injury to the specimen). The grooves lack the light lines that are typical of certain other species of the genus. Seven folds are confined to the tail. Scales are absent or rare in the anterior third of the body ; they form an incomplete row at the 64th fold, and extend practically around the body at the 100th fold. Posteriorly there are two complete rows in each fold and occasionally part of another row may be present.

The teeth have the following formula :

Maxillary-premaxillary, 16-17 ; vomeropalatine, 17-19 ; mandibular, 19-20 ; splenial, 8-9.

The total body length is 157 mm. The body width, 7.6 mm.

***Ichthyophis subterrestris* Taylor 1960**

Ichthyophis subterrestris Taylor, *Univ. Kansas Sci. Bull.* 40 : 65-67, 1960 (type locality, Kottayam, Travancore, India. Type, No. 73927 "Travancore-Cochin", Chicago Nat. Hist. Museum.)

Two specimens in the collection of the Bombay Natural History Society belong to this species :

No. 217, from Injiparai Estate, Anamalai Hills, agrees well with the type in most characters. Only nine transverse folds can be counted on the injured tail : the expected number is 16 to 18. The count of 355 for the folds is probably low, and should be 364, if allowance is made for the missing caudal folds. The tooth formula is :

Maxillary-premaxillary, 23-23 ; vomeropalatine, 23-23 ; mandibular, 20-20 ; splenial, 13-13.

No. 223, from Alibag, Kolaba Dist., Bombay, is a small specimen, probably recently transformed, that has been broken into several pieces. No attempt has been made to count the folds.

This species is seemingly distinguished from other species of the Indian peninsula by the following combination of characters : the shape and position of the tentacular opening ; the elongate tail with the high number of transverse folds ; the tail length being contained in total length only 22.2 times ; and the enlarged mandibular teeth. The colour of the venter (dark) separates it from *peninsularis* and the body proportions of the two species seem to be somewhat different.

Ichthyophis peninsularis Taylor 1960

Ichthyophis peninsularis Taylor, *Univ. Kansas Sci. Bull.* **40** : 61-65, figs. 9, 10, 11, 1960 (type locality, Malabar, India. Type, B.M. No. 82, 12-12-6.)

Diagnosis : A large species with a broad, relatively short head ; the eye invisible covered by a raised circular white spot ; the tentacle nearer the eye-spot than to nostril ; body width in length 22 times ; tail long, its length in total length nearly 22 times ; transverse folds 363-366 ; folds on tail, 18 ; vertebrae, 116. Splenial teeth 3-4 on each side ; mandibular teeth large. Ventral surface very light, probably yellow or cream colour in life. A well-defined cream spot at vent.

The increased number of vertebrae, the coloration of the venter, and reduction in size of the vomeropalatine teeth seem to separate this species from other Indian species. Other differences are evident on a comparison of the type descriptions.

Ichthyophis malabarensis Taylor 1960

Ichthyophis malabarensis Taylor, *Univ. Kansas Sci. Bull.* **40** : 80-84, figs. 20, 21, 22, 1960 (type locality, Maduvangard, Travancore, India. Type B.M. 94. 3. 15. 3).

Diagnosis : Large, reaching a length of approximately half a metre, and the largest Oriental species. Tail proportionally long, its length in total length 23.5 times ; transverse primary and secondary folds 360,

14 confined to tail; vertebrae 111; splenial teeth, 10-10; tentacular opening near edge of lip, closer to eye than to nostril. Scales four to five in each fold except the most anterior ones.

Remarks : It would appear that this species is rare in its range or that it burrows to a considerable distance below the surface of the earth. A creature so conspicuous would otherwise be better known. Despite the fact that it is the largest caecilian reported from Asia, it has a relatively low number of vertebrae (111). The number of folds on the tail is 14, a lower number than occurs in certain other Indian forms.

The specimen is a female containing many large eggs (5.6 mm. in diameter), the number estimated to be more than 60.

***Ichthyophis bombayensis* Taylor 1960**

Ichthyophis bombayensis Taylor, *Univ. Kansas Sci. Bull.* 40 : 67-69, fig. 12, 1960 (type locality, Waghai Surat, Bombay, India. Type, B.M. No. 86. 6. 11. 1.)

Diagnosis : A large species (390 mm.) having 386 transverse folds, 14 confined to tail; splenial teeth, 9-9; body width in length, 26 times; vertebrae, 121; colour in preservative, dark brown above, somewhat lighter brown below; tail relatively long contained in total length about 25 times; tongue tending to cover the splenial teeth; mandibular teeth much larger than maxillary-premaxillary series; vomeropalatine teeth relatively small, scarcely extending through the thick gums.

Remarks : The increased number of vertebrae, the coloration, the enlarged mandibular teeth and the reduction of the size of the vomeropalatine teeth seem to separate this from southern Indian forms. The specimen is a male.

***Ichthyophis sikkimensis* Taylor 1960**

Ichthyophis sikkimensis Taylor, *Univ. Kansas Sci. Bull.* 40 : 91-95, figs. 28-30, 1960 (type locality, Darjeeling, India. Type, No. 64216, Calif. Acad. Sciences.)

Diagnosis : A medium-sized species, characterized by 106-108 vertebrae; primary and secondary transverse folds 276-292; series of splenial teeth (9-9 or 10-10); tail short, contained approximately 50 times in total length, bearing five or six folds from front of vent; tentacle near lip, closer to eye than to nostril. Scales sparse or absent in anterior half of body; two to four rows in each fold posteriorly.

Variation : No. 2685* has the pharyngeal region considerably thickened and widened. The eye area is milky white, the pupil not visible. The tongue seemingly is not completely developed. It is

*Museum of Comparative Zoology, Harvard.

very short, covering the splenial teeth, and its posterior limit is a ridge curving forward. This specimen agrees reasonably well with the others in tooth counts, vertebrae, and transverse folds. It is, judging from the tongue, a recently transformed specimen that has not attained all the adult characters.

No. 2574*, the other Sikkim specimen, is very light, almost white, on the venter and nearly white on the chin. I cannot be certain that this specimen has not been faded somewhat by light. The two Darjeeling specimens vary but little from each other. Nothing is known of the exact habitats except that No. 2685 comes from the Rungeet Valley.

Ichthyophis tricolor Annandale 1909

Ichthyophis glutinosus tricolor Annandale, *Rec. Ind. Mus.* 3 : 286, 1909 (type locality, Maddathori, India) ; *ibid* 9 (4) (19) : 346-347, 1915 (Western Ghats, Cochin).
Ichthyophis tricolor Taylor, *Univ. Kansas Sci. Bull.* 40 : 113-114, 1960.

Since I proposed the revival of the name *tricolor* for a species of *Ichthyophis* in India, I have been able to examine certain specimens of the species in the collection of the British Museum. These specimens agree with the extremely brief colour description by Annandale, who saw three specimens. He mentions one that measured 280 mm. in length, but gives no other anatomical data. Annandale regarded *tricolor* as a variety of *glutinosus*, but it is not known what form was called *glutinosus* by him.

The two British Museum specimens are No. 93. 4. 18. 26 from Peermad, Travancore, and No. 82. 12. 12. 5 from the 'Nilgiris'. The second specimen was presumably taken in the same general locality as four specimens of a different species that lacks the ventral white stripe. The counts of the teeth of the two specimens are respectively :

Maxillary-premaxillary, 19-19, 20-21 ; vomeropalatine, 23-24, 28-29 ; mandibular, 15-15, 19-19 ; splenial, 24-23, 25-26.

The mandibular teeth are the largest, while the splenials are relatively very small. The tentacle is nearly equidistant from the eye and the nostril (2.3 mm. and 2.45 mm. respectively). The number of transverse folds is low, 245 for the male, 275 for the female. The lateral yellow stripe extends from near the tip of the snout to the tip of the tail, dividing at the angle of the mouth. A broad white (or yellow) midventral stripe is separated from the yellow lateral stripe by a stripe of brownish lavender, with a rather indefinite edge. The jaw and part of the chin are cream with a slightly pigmented area near the centre of the chin.

*Berlin Museum.

Scales are present throughout the body, the first folds having three rows of rather large scales widened transversely, the posterior folds having seven rows in each fold.

Variable characters of *Ichthyophis tricolor* Annandale :

Specimen	BM	
	93.4.18.26	82.12.12.5
Sex	Male	Female
Total length (in mm.)	226	296
Tail (in mm.)	4	4.85
Body width (in mm.)	12.8	12.8
Head width (1st groove) (in mm.)	8.1	9
Distance between eyes (in mm.)	5	5.5
Eye to tip of snout (in mm.)	4.65	5.6
Head length (to 1st groove) (in mm.)	11	13
Head length (to 3rd groove) (in mm.)	21	19.8
Eye to tentacle (in mm.)	2.3	2.5
Tentacle to nostril (in mm.)	2.5	2.6
Transverse folds	245	275

The male specimen came from an elevation of 3300 ft. (1005 m.).

***Ichthyophis beddomii* Peters 1879**

Ichthyophis beddomii Peters, *Monatsb. Akad. Wiss. Berlin*, 1879, p. 931, pl.—figs. 1-3 (type locality, Nilgiris, India); Taylor, *Univ. Kansas Sci. Bull.* **40** : 113, 1960.

Ichthyophis glutinosus (part.) Boulenger, Catalogue of the Batrachia Gradientia s. Caudata and Batrachia Apoda in the collection of the British Museum, 1882, p. 90.

I have referred three specimens in the collection to *Ichthyophis beddomii* Peters. These are: Nos. 219 and 220 from Ootacamund, Nilgiri Hills, southern India, and No. 527 from near Gersoppa Falls, North Kanara, India (the last was taken on a laterite path by day, and was said 'to progress by a series of ripples reminiscent of a millipede').

Peters distinguished this species by the following characters: tentacle near lip, nearly equidistant from the eye and the nostril; the head small, pointed or acuminate; a lateral stripe on the body, and low number of transverse folds on the body (240 in the type).

The type of this species, formerly No. 5545 in the Berlin Museum, was not to be found on my recent visit there, and Dr. Heinz Wermuth, the Curator, believed that the specimen had been lost.

It will be seen from the following table that the type has fewer transverse folds and the body is narrower in proportion to length than the other specimens listed.

Specimen	BNHS 220	BNHS 219	BNHS 527	Type
Total length (in mm.)	265	257	185	225
Head width (in mm.)	7	—	—	—
Head length (in mm.)	9.3	—	11	—
Body width (in mm.)	16	15	11	10
Width in length (times)	16.5	17	16.5	22.5
Transverse folds, total	293	284	281	240
Transverse folds on tail	5	5	—	5
Maxillary-premaxillary teeth	23-23	23-25	24-25	—
Vomeropalatine teeth	28-27	27-27	23-24	—
Mandibular teeth	25-26	22-22	24-24	—
Splenic teeth	26-25	24-25	25-26	—

Moreover the count of folds (240) is lower than in 15 other specimens of the species I have been able to examine, most of which are from the Nilgiri Hills. Three specimens in the British Museum from 'Wynaad, Nilgiris, India' have counts of 255, 263, and 273. The number of maxillary teeth in these specimens is a little less than in the specimens listed above. Tail length in total length about 30 times.

In all, the lateral yellow stripe is widened anteriorly so that there is a suggestion of two yellow triangles joined to the lateral stripes on the throat. A fork from the stripe beginning at the mouth-angle extends anteriorly to the tip of the lower jaw.

Usually one or two rows of scales are present in the folds on the anterior part of the body (beginning on the first or second fold). Posteriorly there are usually four rows in each fold.

It is impossible to state now whether this variation in the number of folds is a result of sex, elevation, or individual variation.

KEY TO GENERA OF GYMNOPIHONA IN INDIA

1. Tentacle closer to eye than to nostril (or tip of snout) or equal 2
Tentacle closer to tip of snout than to eye.. 3
2. Anal opening transverse; the tentacle cone-shaped, on a level with a line between eye and nostril; no tail; 144 vertebrae; splenic teeth present.. *Indotyphlus*
Anal opening longitudinal; tentacle near edge of lip below level of a line between eye and nostril; tail present; vertebrae not over 125; splenic teeth present or absent *Ichthyophis*
3. Squamosal and parietal bones of skull separated by a diastema. Tentacle flaplike situated almost directly below nostril near mouth; orbit circular enclosed; tail region wider than body *Uraeotyphlus*
Squamosal and parietal bones forming a common suture 4

4. A single row of teeth in lower jaw. No splenials *Gegeneophis*
 Two rows of teeth in lower jaw ; eye covered over by bone ; tentacle conical
 somewhat behind nostril but below its lower level *Herpele*

KEY TO INDIAN SPECIES OF *Ichthyophis*

1. A lateral stripe of cream or yellow on side of body from head to tail ;
 splenial teeth usually more than 20 on each side 2
 No lateral stripe of cream or yellow on side of body ; usually less than 20
 splenial teeth on each side 4
2. Venter uniform brown lavender, to plumbeous ; position of tentacle
 variable 3
 Venter with a broad white or yellow mid-ventral stripe ; tentacle near lip
 and nearly equidistant from eye and nostril ; transverse folds 245-275 ;
 tail length in total length 56.5 times ♂, 60 times ♀ *tricolor*
3. Tentacle nearly equidistant from eye and nostril ; lateral yellow stripe
 widens in region of throat ; fewer transverse folds (240-293) .. *beddomii*
 Tentacle near lip, much closer to eye than to nostril ; higher count of ven-
 tral folds (300-400) lateral stripe not widening under throat
 ? *glutinosus* vars.
4. Number of folds on tail less than ten ; body folds less than 300 ; tail length
 in total length about 50 times ; splenial teeth 9 or 10 on each side ; verte-
 brae, 106, 108 ; scales sparse or absent anteriorly, two to four rows
 in posterior folds *sikkimensis*
 Number of transverse folds on tail more than ten ; on body usually more
 than 300 ; tail length in total length less than 30 times 5
5. Splenial teeth four or less on each side ; 18 transverse folds on tail ; verte-
 brae 116 ; body width in body length, 20-22 times ; venter light coloured
 (perhaps cream or yellowish in life) ; total length, 330 mm. .. *peninsularis*
 Splenial teeth five or more on each side in full-grown animals, transverse
 folds 356-386 ; tail folds, 14-18 6
6. Number of mandibular teeth high (28-28) ; tail in total length about 23.5
 times ; body width in body length 27 times ; vertebrae 111 ; scales in
 anterior folds small sparse ; posteriorly four or five rows in each fold ;
 venter light (perhaps cream or yellow in life) ; total length 494 mm.
 *malabarensis*
 Number of mandibular teeth reduced (17-20) 7
7. Mandibular teeth, 20-20 ; splenial, 9-9 ; transverse folds 386 ; 14 folds
 confined to tail ; width of body in total length 26 times ; tail length in
 total length 25.6 ; venter brown to lavender brown ; one row of scales
 in anterior folds, three in posterior ; total length, 390 mm. .. *bombayensis*

Mandibular teeth very large, 17-17; splenial, 10-10; transverse folds 356-364, 18 confined to tail; body width in total length 21 times; venter dark lavender brown; two rows of scales in anterior folds; four or five in posterior rows; total length 295 mm. *subterrestris*

A study is in progress of the forms of Indian caecilians hitherto confused with *Ichthyophis glutinosus*. The provenance of the type (still in existence) has not been yet satisfactorily determined, and these forms are not treated here.